

## Math 5310 - Homework 1

Let  $A_i$  be a family of sets,  $i \in I$ , and let  $C$  be a set.

1. Prove that  $(\bigcap_{i \in I} A_i) \cup C = \bigcap_{i \in I} (A_i \cup C)$ .

2. Complete the following proof of the identity

$$C \setminus \left( \bigcup_{i \in I} A_i \right) = \bigcap_{i \in I} (C \setminus A_i)$$

Proof: Let  $x \in C \setminus (\bigcup_{i \in I} A_i)$ . Thus  $x \in$  \_\_\_\_\_ and  $x \notin$  \_\_\_\_\_.  
Therefore  $x \in$  \_\_\_\_\_ and  $x \notin$  \_\_\_\_\_ for any  $i \in I$ . Thus  
 $x \in$  \_\_\_\_\_ for all  $i \in I$ , so \_\_\_\_\_.

Conversely,  $\dots$ .

3. Prove that  $C \setminus (\bigcap_{i \in I} A_i) = \bigcup_{i \in I} (C \setminus A_i)$ .